

BAT CONSERVATION PROGRAM

METRO TORONTO ZOO

BIODÔME
DE MONTRÉAL

FONDATION DE LA FAUNE
DU QUÉBEC

BAT BOX EDUCATION PROGRAM

Bats are perhaps the most misunderstood animals on Earth. Yet bats play a vital role in ecosystems around the world.

The goal of the Bat Box Education Program is to educate the public about the importance of bats as a component of our ecosystems, and to eliminate the misconceptions that contribute to unnecessary fears.

Although it is preferable to leave bats in their traditional roosts, we can learn what bats require and prefer as roosting sites by offering alternative housing in a bat box. Bat boxes are not meant to encourage eviction of bats from existing locations, however, they offer alternative housing for bats when possible roosting sites are few in number or when they are being evicted from their present location.

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Bats have been flying the skies for well over 50 million years, and these ancient bats are virtually indistinguishable from the bats flying around today. Although wings are their most distinctive characteristic, the variety of their physical features is their most striking quality.

Most bats are insectivorous, while some consume fruit, nectar, or pollen. A few species feast on fish, frogs, flowers, leaves and even blood. There are only three species of bats that consume blood. Two of these species feed primarily on the blood of birds while only one specie, the common Vampire bat, feeds exclusively on the blood of mammals. Contrary to popular belief, Vampire bats prefer the blood of cattle and horses, not sleeping humans! These bats only inhabit regions of Central and South America.

Bats range in size from Indonesia's Giant flying fox with a 2 metre wing span, weighing 1.5 kg, to Thailand's Hog-nosed bat which is about the size of a bumblebee and weighs less than a penny.

THREATENED, BUT NOT THREATENING

Misconceptions have played a primary role in the persecution of bats. They are often thought of as blind, blood sucking vampires who fly into people's hair. Yet, bats are gentle, beneficial and interesting creatures, suffering from false human beliefs, attitudes and misconceptions.

With over 900 species of bats worldwide, it is no wonder that bats are of great ecological importance. With the exception of the Arctic and Antarctic, bats inhabit all regions of the Earth. About 70% of bats worldwide feed almost exclusively on insects. Some bats pollinate flowers and disperse seeds in a wide range of ecosystems, from rainforests to deserts.

Eastern Canada supports eight species of insectivorous bats, all of which are declining in numbers for various reasons. Destruction of bat roosts, pesticides, habitat destruction and even hobbies such as caving, all contribute to decreasing bat populations.

Common Name <i>Scientific Name</i>	Description	Common Name <i>Scientific Name</i>	Description
Big brown bat <i>Eptesicus fuscus</i>	Wingspan: 32-39 cm. Brown fur, darker above, lighter below. Small ears. Often found in human dwellings.	Silver-haired bat <i>Lasionycteris noctivagans</i>	Wingspan: 27-31 cm. Heavily furred. Black or dark brown fur with white-tipped hairs. Roosts under tree bark or wood piles.
Little brown bat <i>Myotis lucifugus</i>	Wingspan: 22-27 cm. Fur variable: upperparts yellowish to dark brown. Underparts lighter. Juveniles darker in color. Most common and widely distributed Canadian bat. Often found in human dwellings.	Red bat <i>Lasiurus borealis</i>	Wingspan: 28-33 cm. Color of fur varies: yellow-red, orange, or yellow/grey. Roosts almost exclusively in foliage of trees.
Eastern small-footed bat <i>Myotis leibii</i>	Wingspan: 21-25 cm. Glossy brown fur, golden sheen, black ears and flight membranes. Small feet compared to other species in Canada. Roosts under rock slabs and in mines. Relatively uncommon.	Hoary bat <i>Lasiurus cinereus</i>	Wingspan: 34-41 cm. Silver-white tipped hairs on back. Thick coat. Often roosts in tree foliage. Largest bat in Canada.
Northern long-eared bat <i>Myotis septentrionalis</i>	Wingspan: 23-26 cm. Brown fur, guard hairs not glossy. Black ears, longer than other bats. Often roosts under bark of trees or inside caves.	Eastern Pipistrelle <i>Pipistrellus subflavus</i>	Wingspan: 20-26 cm. Tricolored fur: base dark grey, middle yellowish brown, tips brown. Premolar in upper and lower jaw. Rarely found in buildings. Relatively uncommon.

BAT FACTS !

Bats Are Not Mice!

As a matter of fact, bats are more closely related to humans than to rodents. *Bats are mammals*, just as people are, and therefore, share many common characteristics. They have fur or hair, give birth to live young, and feed their newborns milk until they are old enough to fend for themselves.

Bats are of the order Chiroptera, meaning hand-wing. These wings (made of two layers of skin) are much the same as human hands, with a thumb and four fingers. Although a bat's hand is very large in proportion to its body, it has the same number of hand bones as humans.

Blind as a Bat

In fact, all bats can see. Flying foxes (fruit bats) have excellent vision which they use with their acute sense of smell to locate ripe and juicy fruit. Most bats also have the ability to echolocate, or to use sound to "see". Because bats hunt at night when it is difficult to see, sonar is most often used to locate prey. Bats emit sound that hits objects and comes back as echoes, and by comparing the original signal with the echo, a bat can tell where the object is and how fast it is moving.

Did You know ?

Bats are the primary predators of night flying insects, and play a vital role in reducing their number. A single Little brown bat is capable of eating its own body weight in insects in one night. That could be up to 600 in an hour! A few bats can go a long way to reduce the annoying bugs around your home or cottage during the summer months.

Bat Attitudes

Insects often hover around people, and a hungry bat may swoop down in hot pursuit of a meal. A bat's sonar ability is so sophisticated that it can detect objects far smaller than a human hair and intercept that object at speeds of over 30 km/hr. Bats are far too agile to get caught in someone's hair!

Echolocation pulses are produced by the vibrations of the vocal chords in the larynx and are emitted through the mouth or nose. Some bats have elaborate noseleaves or facial structures that may function to channel and beam sound emitted through the nostrils. Fishing bats have sonar so acute that they can detect a minnow's fin as fine as a human hair, protruding only 2 mm. above a pond surface.

QUESTIONS ABOUT BATS

Is rabies a cause for concern when attracting bats into a bat box?

Like most mammals, bats can contract rabies, but it is a common misconception that most bats are rabid. A greater percentage of people die each year from bee stings. You have a greater chance of being hit by lightning, than by being bitten by a bat. Bats with the active form of the virus are immobilized within two days and dead within four to five. Although the vast majority of sick bats are not rabid, one should not take chances. Avoid contact with any wild or unfamiliar animal. If you must handle a bat, wear leather gloves.

Can bats transmit Histoplasmosis?

Histoplasmosis is a disease of the lungs caused by inhaling the spores of the fungus, *Histoplasma capsulatum*. This fungus grows in highly organic soils, such as that found below bird or bat roosting sites, and in caves. As a rule, the fungus does not survive in hot and dry attics. Human infection from bats occurs most frequently in hot and humid caves, where bat numbers are in the thousands. The most important source of infection appears to be pigeon and chicken roosts. Bat researchers or guano collectors appear to be the ones most at risk. To be on the safe side, one should always wear a properly fitted facemask or respirator when in contact with, or cleaning a significant amount of bat guano.

Why would a bat come into my house or cottage?

Depending on the time of year, there may be several explanations why a bat has found its way into your home. If the bats are roosting in the walls or attic, they occasionally end up inside rather than outside. An unscreened chimney or fireplace is also a way of entry into your home. If you find a bat during the summer, chances are that it is this year's young learning to fly, whose navigation and "sense of direction" are not fully developed. For some reason, this holds true for the occasional adult as well.

Don't Take Any Chances

It is essential that people, especially children be cautious about the potential dangers of contact with unfamiliar animals. They should be warned that any bat that can be easily caught is more likely than others to be sick and should not be handled. The same caution applies to all wild animals.

IF YOU MUST HANDLE A BAT, WEAR LEATHER GLOVES. REMEMBER THE BAT IS FRIGHTENED AND AS WITH ALL WILD ANIMALS, MAY BITE IN SELF-DEFENCE.

Occasionally during the winter, temperatures will increase enough to wake the bats from hibernation. At these times, a bat may find its way into your home and be found in the bathroom or laundry room sink. The bats become dehydrated during the over-wintering process and are seeking water.

Place the bat in a cardboard box with a small bowl of water. Close the lid, keeping it dark and quiet. At dusk, release the bat outside. It should find its way back to the roost. If you must remove the bat immediately, use the capture method discussed above and take the bat outside. Place it on the trunk of a tree, don't leave it on the ground where it could fall prey to predators.

What to Do when a Bat Gets in Your House

- *If the bat is almost hairless*, it cannot fly and still depends on its mother to look after it. If possible, place the youngster near or in the roost so its mother can retrieve it, otherwise, it is likely to die.
- *If the bat is flying about*, try to contain it in one room. If this happens at night, open a window and turn off the lights. The bat will usually find its own way out. If this method does not work, try throwing a tea towel or light weight blanket over the flying bat, capture it and move it outside.
- *If the bat is roosting*, take a waste paper basket, put it up over the bat, slip a magazine between the ceiling and the basket, and gently push it along to get the bat to drop into the basket and then move it outside. Regardless of the reason for being in your house, the bat's main objective is to find the quickest way out!

A YEAR IN THE LIFE OF A BAT

Energy Saving: A Survival Strategy

As previously mentioned, all Canadian bats are insect eaters. The cold winter temperatures limit the number of active insects, so bats must find a way to survive the winter without food.

Although three species migrate short distances (Hoary, Red and Silver-haired bats), other temperate bat species survive the winter by hibernating.

As winter approaches, the bats begin returning to their hibernacula, where they can wait out the winter. A suitable location is not easy to find, as it must meet several criteria. Humidity must be high while the temperature remains stable, just above freezing. Suitable hibernacula include caves, abandoned mines, storm sewers, or cellars with cave-like conditions.

Bats survive due to a remarkable, energy-saving strategy. They can cool their body temperature down to approximately the same temperature as their surroundings; by slowing down their heartrate, breathing, and other body functions. During active states, the heartrate of a bat ranges between 400 and 1000 beats per minute, however, during hibernation the heartrate is reduced to less than 25 beats per minute. Body temperature also experiences a dramatic decline. Normally, body temperature reaches 36°C, but while in a state of torpor (hibernation) the temperature decreases to 3-6°C. Hibernation lasts approximately from October to April. In autumn, 35% of the bat's weight may be fat, all of which will be gone by spring.

Approximately every 12-30 days during hibernation, bats will become active in order to drink and rid their bodies of waste products. The humidity of the hibernation site is very important because bats soon dehydrate unless the site remains humid.

Waking Up Is Hard to Do

The arousal procedure is the most expensive part of hibernation, because the bat must internally generate enough heat to raise its body temperature from the ambient air temperature which could be 3°C, to normal body temperature; about 40°C. The stored fat generated in the summer is the fuel used to arouse the bats. By early spring the fat reserves are nearly exhausted. This is a critical time because bats must feed or starve. Poor spring weather could result in many bats dying of starvation.

Delayed Fertilization: A Unique Feature

Although mating has taken place in the autumn, before hibernation, fertilization does not occur until spring. The female carries the live male sperm in her body all winter. After the rigours of hibernation, she ovulates and fertilization takes place; a feature of reproductive biology unique to bats.

The embryo develops at a rate dependant upon food and temperature. If the weather is cold, the female becomes torpid and development is dramatically slowed, therefore lengthening pregnancy. At this time, females usually roost in single sex groups, and it is into these groups that the babies are usually born between late May and late June. These nursery colonies may contain many hundreds of females and their babies. Males tend to roost in cooler positions, usually alone or in small groups.

Females usually produce one young per year, with the exception of Eastern pipistrelle, Hoary, and Big brown bats who occasionally have twins, and Red bats who may have 2, 3 or even 4 young.

Do Not Disturb!

Hibernating bats are extremely vulnerable because it takes them such a long time to become active. They are easily disturbed by noise and light and will begin to use up some of their valuable fat reserves as they wake up. Bat populations often collapse when hibernation is interrupted, therefore hibernacula should be free from disturbances.

The Problems that Bats Face

At birth the young weigh about one quarter of the mother's weight, but by three weeks, they are nearly full size and some have now begun to fly. Milk is provided for another few weeks, until the juveniles can catch their own insects. By August, the offspring are almost independent, but move around with adults learning the locations of roosts and feeding areas.

After birth of the young, the female must quickly begin to build up fat reserves for hibernation, and as the summer comes to an end, females must also search for mates. The entire cycle begins again, with both males and females searching for suitable hibernacula, often the same place they occupied the previous year, provided the location has not been disturbed or destroyed.

Bat species are experiencing population declines. Deforestation, pesticide use, mine closures and unnecessary eviction procedures are reducing populations dramatically. Some bat species have attempted to adapt to the loss of habitat and roosting sites by relocating into wood-framed buildings, attics and eaves. However, renovations to older buildings and the use of modern, tighter construction methods rapidly reduce the availability of roost sites for bats.

Caving is an activity growing in popularity, yet it often disturbs bats during the state of hibernation. Disturbing a bat during hibernation can consume up to two months supply of stored energy, which may result in death by starvation.

Bats also become victims in the war to control unwanted insects. Most toxic chemicals used against insects are neutralized when stored in body fat. As the bat uses its fat reserves, it is exposed to concentrated doses of pesticides. Nursing bats acquire pesticides from their mother's milk. While milk is their main food,

the young put on weight, but at weaning, fat reserves are consumed, and with that, the pesticides. Migrating and hibernating bats also use up their fat stores and, at this time show signs of poisoning.

The closure of mines and caves can mean the loss of many hundreds or thousands of bats. When caves and mines are blocked or destroyed, these bats are deprived of essential shelter.

Why Protect Bats ?

Unknown to many, bats play vital roles in maintaining the balance in ecosystems. Colonies of bats are capable of consuming tons of bugs each evening, so farmers are among the ones to benefit. A single Little brown bat can consume up to 600 insects in one hour, helping to free your home or cottage of unwanted insects. In addition, the presence of bat colonies in close proximity to orchards can decrease pesticide requirements by 50 per cent.

In other countries of the world, bats are pollinators and seed dispersers. Bananas, peaches, dates and mangoes are just a few examples of fruits that depend on bats for pollination. Some cactus plants require bats for pollination, otherwise they will not produce fruit.

In North America, bats pollinate more than 60 species of agave including those used by the Mexican tequila industry! Fruit-eating bats of tropical regions contribute to the process of reforestation, by spreading seeds and initiating germination, as some plant species will not germinate unless the seeds have passed through the digestive tract of a bat!

ROOSTING SITES OF BATS

Keeping Bats Out!

Bats spend daylight hours in a refuge called a day roost. Appropriate warm temperatures are an important factor for such a roost as many species of bats will occupy the same roosts year after year. Day roosts often include mines, caves, hollow trees, bat boxes, and buildings such as homes or cottages.

A night roost is a temporary shelter for periods of rest between feeding and grooming. Piles of droppings in spots where bats are not seen during the day will alert you to a night roost location.

Unlike many birds, bats often over-winter in Canada. They generally select a hibernaculum that is underground, offering high humidity and temperatures that remain just above freezing. Suitable hibernacula include caves, abandoned mines, storm sewers, or cellars with cave-like conditions. For bats to survive our long winters without food, they minimize their energy use by lowering their body temperatures and slowing down their heart rates. This is called a state of torpor, or hibernation.

It is preferable to look upon bat eviction as a last possible alternative. In some cases, there is no reason why bats should not roost in a building, especially if no one else lives there. Bats do not gnaw or cause structural damage. Offering bat boxes as alternative housing may help to increase available roosting sites and eliminate any unnecessary killing of bats.

Bat Habitats to Protect

If bat populations are to survive in their natural environment, mankind must protect the following habitats where bats find food and shelter:

Foraging

Beaver ponds
Marshes
Streams
Farm ponds
Large drainage ditches
River drainages

Roosting

Caves
Dead, hollow snags
Live cavity trees
Abandoned homeplaces
Old stone chimneys
Crevices in rocks

A colony should not be evicted during the breeding season. Young bats that cannot fly will be trapped in the roost to die and decay. Eviction should be performed in April before the young are born, or in late August to mid September when the colony is dispersing.

If there are no other options but eviction and you plan to do the job yourself, here are some important steps to follow.

Step 1:

Observing. The only effective way to resolve a bat problem in a building is to determine how they are getting in and block their access. Regularly used openings are easily recognized by the stains around the edges. Watch at dusk for a few evenings. Take note of where they exit and count the number of bats as they leave. If possible, take this count for a few consecutive nights. It is very important for you to know how many bats you have, so that you don't seal any in the building.

Step 2:

Installing the bat box. Bats require a predator-free shelter, and so generally the higher you place your bat box, the better. We recommend that wherever possible, bat boxes should be placed near the bats entry and exit ports, before eviction procedures start. In some cases, bat boxes have been incorporated right into the dormers where the bats were roosting. Once you have hung the boxes, you are ready to evict the bats. The number and size of the bat boxes will depend on the size of the colony, but installing more than one box is recommended.

Step 3:

Limiting the number of holes. Begin sealing the holes with silicone caulking, steel wool, mortar, or even temporarily with duct tape, keeping in mind that some bats can squeeze through a space of 2 cm. Leave one or two holes unsealed for several days, so the bats can get used to using these openings.

Step 4:

Eviction. Finally, hang polypropylene bird netting or a .65 cm steel screening called hardware cloth, available at hardware stores and nurseries. It can be hung during the day above the emergence holes using duct tape or staples. Drape the material over the holes, leaving the bottom edge free. This way any stragglers can crawl down the cloth and get out, but returning bats cannot get in. When you are sure they are all evicted, seal the last holes permanently.

IMPORTANT Eviction techniques such as leaving bright lights or a fan on, spreading moth balls or using pesticides are not effective methods. People have tried everything, but unless you spend time plugging all the holes the bats will be back. They are very traditional about the sites they use.

Choose the Right Specialist

If you decide to choose an excluder of your own, a few words of caution. Not all pest control organizations or individuals have a great deal of experience with bats. Some may attempt to poison or fumigate them, which is an illegal procedure. In fact, the only sure way to exclude bats is to prevent them from re-entering after their nighttime exodus. Be sure you have read the above procedure before hiring anyone to do the job.

The following are a few questions you should be sure to ask prospective bat evictors:

1. What methods will be used to evict the bats, and is the time of year suitable for eviction?
2. Will the company make an initial assessment of the building, and how long will the procedure take?
3. How many bat boxes will you need to supply prior to beginning the eviction process?
4. Is there any guarantee provided by the excluder in the event that bats return?

If your bat problem is larger than you can handle, or you just need some advice from an expert, Friends of Bats would be happy to provide you with the contact of a reputable bat excluder.

BAT BOX PLANS

Don't forget to use rough cut wood or score the inside of the box. Bats need a rough surface to hang from. You could also line the box with 0.3 cm mesh (plastic) netting available in most hardware stores.

You may also lengthen or add a partial bottom to the box, ensuring that predators, such as cats and raccoons cannot reach inside. Longer vertical partitions allow for greater temperature variance within the box. Bats can move up for maximum warmth, or climb down to cool off.

Research indicates that bats seem to occupy boxes whether you evict them or not, therefore boxes are multipurpose and may be used before excluding bats or to offer housing for bats in the area. From our surveys, the large box or boxes with several partitions have had the greatest rate of occupancy when compared to the success of other boxes.

There is no bottom to the boxes, so fecal material drops out. No cleaning necessary!

(2.54 cm = 1 inch)

Model 1

A. Top	61 cm x 7 cm
B. Front	61 cm x 55 cm
C. Back	61 cm x 67 cm
D. Sides (2)	2 cm x 55 cm
E. Mesh netting	

Model 2

A. Top	25 cm x 23 cm
B. Front	25 cm x 30 cm
C. Back	25 cm x 40 cm
D. Partition	20 cm x 23 cm
E. Bottom panel	25 cm x 16.5 cm
F. Sides (2)	15 cm x 30 cm/36 cm
G. Entrance	2 cm

Model 3

A. Roof	42 cm x 30 cm at 35°
B. Front	48 cm x 23 cm
C. Back	69 cm x 23 cm
D. Ceiling	18 cm x 28 cm with a 16 cm x 3 cm opening
E. Partitions (3)	18 cm x 20 cm
F. Partitions (2)	18 cm x 35 cm
G. Sides (2)	28 cm x 48 cm/69 cm
H. Attic	
Partition spacing (front to back): 2 cm, 2 cm, 2 cm, 2.5 cm, 4 cm, 3 cm	

Note: Use 2.5 cm thick wood and make sure bat entrance openings are 2 cm to 2.5 cm wide.

(Source: Bat Conservation International)

BAT BOX QUESTIONS AND ANSWERS

Can bats be introduced artificially into an area?

Bats have strong homing instincts. When bats are removed from an area against their own free will, they frantically attempt to make their way back. For this reason, artificial introduction into a new bat house is discouraged. However, if you wish to attract bats to your area, there is nothing to stop you from installing a box. Many people have gotten occupancy simply by mounting a bat box and letting the bats move in on their own.

When is the best time to install a bat box?

Bat boxes should be installed in March or early April so that female bats have a warm, safe, shelter before giving birth in May-June. Once bats inhabit a box, they generally prefer to stay there. In the late summer months, most bats would not be looking for a new home unless theirs had been destroyed. However, you could build and install your bat box in late summer or fall for early occupancy the following spring. In late summer, some Canadian bats move out of their summer roosts and migrate to a warmer climate, while others migrate to locate suitable hibernation sites in caves or mines.

Remember the following important criteria:

1. Bat boxes require a minimum of 7-10 hours of direct sunlight.
2. Caulk or seal all cracks, joints etc. to weather and light proof your box.
3. Paint the exterior of your bat box a dark brown or black colour to increase heat absorption.
4. Bat boxes should be mounted 5 to 7 metres above the ground, preferably on a pole or building, not on a tree and free of flight obstacles.
5. Install your bat boxes close to a water source.

Where should I install my bat
box?

Bats require a shelter that is free from predators, and so prefer their dwellings a fair distance from the ground. Generally, the higher the better however, for practical purposes heights of 5-7 meters appear sufficient. It is suggested that boxes be mounted to either a pole or the side of a building, **as long as exposure to sunlight is adequate**. Bats prefer fairly hot conditions, so installing your box on a southerly facing brick wall as opposed to a wooden wall will increase heat absorption. In order to provide sufficient sunlight, it is important that your box be located away from dense woods or shrubbery, preferably along the edge of a woodlot or clearing. **It is not recommended that bat boxes be installed on trees where they are sheltered from the sun and flight is hindered by branches.**

How much sunlight and heat are required?

It should be kept in mind that exposure to sun is one of the most important criteria for determining use of boxes. Mount your bat box facing a southerly exposure, free from obstacles and wind, to provide a minimum of 7-10 hours of direct sunlight each day. The temperature inside the box should not exceed 32°C (or 90°F). **Ideally one would install two houses back to back, or three houses with different exposures: South, Southeast, Southwest.** This provides bats with an alternative refuge in case the temperature in one box becomes inhospitable. Often, in a nursery situation, the female bats may move to a cooler box during the day leaving their babies in the warmer roost.

Will the age or type of wood affect occupancy of my bat box?

According to recent studies, bats are more likely to occupy a box in the first year if it is made from aged wood, but there is not evidence that bats prefer a particular type of wood. Non chemically treated plywood or barnboard have been shown to work well.

Will painting the bat box decrease the chances of occupancy?

Until recently, it was believed that painting or staining the bat box would deter occupancy. In fact, bats living in cool climates like Canada, may show a significant preference for dark coloured boxes. Painting your bat box a dark colour such as brown or black will increase heat absorption, creating an interior temperature suitable for bat occupancy.

Porch Problems!

Occasionally, bats use porch rafters as a night roost. Some people are not bothered by these bats, but sometimes the presence of bat guano poses a concern. In such cases, there are three methods that have been used to discourage bats from roosting in the rafters. First, hanging plastic strips from the rafters may prevent bats from stopping there to roost. A second suggestion is to install plastic sheets across the ceiling. This blocks the bats' access route to the rafters, and the plastic can be removed once the bats have realized that this location is no longer available for their use. The third option is to hang a mobile from the rafters. This seems to prevent bats from using the rafters and deters them from stopping there.

Do I have to clean my box?

No. Most bat box designs have an open bottom, so droppings will fall through. However, the partitions should be long enough so that the arm of a raccoon or cat cannot reach the bats if they should try to investigate the box. Boxes with semi-closed bottoms can have the bottoms hinged for easy cleaning, or install .65 cm mesh partially across the bottom of the box. The mesh allows fecal material to fall through, but keeps baby bats from dropping out and predators from getting in. If you choose a bat design with an attic (see model 3), you may open the hinged top after the bats leave for the year, and simply whisk the droppings down the centre hole.

When can I inspect my bat box?

Use of your bat box should be obvious by the presence of droppings below the roost. If you wish to check for occupancy, simply shine a flashlight up into the bat box during the day without touching or disturbing it in any other way. To determine actual numbers, count the bats as they emerge at dusk. To check for a nursery colony, shine a flashlight up into the bat box about one hour after dusk, and you should see young bats left behind by their mothers who are out foraging for their evening meal.

Why might bats not use my bat house?

This can be a difficult question to answer. Sometimes it is not clear why a bat box does not become occupied when all of the suggestions for good locations and proper installation are followed. If bats are in your area, a simple explanation may be that the bats are quite happy in the roost site they are in and see no reason to move. It is also important to remain patient. Bats are naturally inquisitive animals, but it may take some time for them to find your box and move in. Occasionally hornets or wasps take up residency in bat boxes and must be removed. They will certainly deter bats from using your box. If your box contains any cracks between the wood, it may be necessary to seal these spaces with caulking or some other form of sealant, as light disturbs bats while they roost during the day.

What are the chances of bats actually moving in?

The success rate for bat box occupancy varies. Research dictates that it depends to a greater degree on location rather than bat box design. If you have excluded bats, the chance of occupancy increases by installing your bat boxes as close as possible to the bats' former entry/exit ports. On the other hand, **they are not likely to move into a box that is entirely shaded**, no matter how close to their original home it may be. **Mounting boxes back to back on tall poles appears to increase your chances of bat occupancy.** You must consider many angles when deciding on a particular location.

Another Housing Idea

Place 1 m wide tin/metal sheeting around a tree. Keep the top quite tight, but leave the bottom open about 2 cm so that the bats can tuck up underneath the tin. This allows the bats to move around the tree to find the temperature they prefer. It must be a minimum of 1 m wide in order to keep predators (ie. raccoons) from reaching up under the sheeting and capturing or disturbing the bats.

Where to Buy a Bat Box

For those of you who would prefer to purchase a bat box as opposed to build one, the following list offers locations where boxes may be purchased. (Ensure the box interior is made of rough or scored wood).

ONTARIO

Wood'n Things
Thornhill, Ontario
(905) 881-0897

White Rose Crafts & Nursery Saled Ltd.
1306 Kennedy Rd.
Toronto, Ontario
M1P 2L5
(416) 755-5345

Orosz Outdoors Ltd.
Box 1193, R.R.#1
Collingwood, Ontario
L9X 3Y9
(705) 444-8277

QUÉBEC

Nature expert
7950, rue De Marseille
Montréal (Québec)
H1L 1N7
(514) 351-5496

One critical requirement for bats seems to be the close proximity to a water source. Most North American species prefer to roost less than 300 metres from water; and like to be near marshes, streams or lakes. This is a direct consequence of their insectivorous diets and their need to drink soon after they leave their roost.

RESULTS OF BAT BOX SURVEYS

During 1995 and 1996, the Metro Toronto Zoo's Friends of Bats conducted surveys on the use of bat boxes by Ontario bats. The objectives were to 1. determine occupancy rates of bat boxes installed on homeowner properties and 2. to determine factors effecting the use of bat boxes by Ontario bats. The occupancy rates of both years reflect the number of surveys returned to us and therefore, rates may be higher than determined by these results.

During the summer of 1995, it was determined that 33% of installed boxes were used by bats. The boxes with two or more partitions were used most often. As hoped, bats seemed to occupy the boxes whether they had been evicted or not, demonstrating that these houses are multipurpose and may be used to attract bats in an area, or when excluding bats from a building.

Roosting Surface of Occupied Bat Boxes 1996		Box Height above Ground 1996	
Hardware cloth 6%	Grooved wood 49%	8.5 m - 10 m 9%	Less than 3 m 17%
Fiberglass screening 6%		7 m - 8 m 9%	
Other 11%		5 m - 6.5 m 22%	3 m - 5 m 43%
Rough wood 28%			

* Note: no bats occupied boxes with a smooth interior.

At the conclusion of 1996, the occupancy rate was lower than expected (22%). This lower occupancy rate reflected the need for proper installation, in a location that is suitable for bats.

Nearly all of the occupied boxes faced a southerly direction, which is consistent with meeting the needs of Canadian bats. Heat requirements are essential, offering one explanation why bat boxes mounted in trees were almost always unoccupied. Even when the box receives several hours of sunlight, the branches that shade the box for the remainder of the day cause rapid cooling to temperatures below the "confort zone" for Canadian bats.

In addition to heat loss, tree branches also act as flight obstacles, making it difficult for bats to manoeuvre to the box. All boxes in the survey that had a smooth interior were unoccupied! This highlighted the necessity for rough or well scored interiors.

The surveys from both years were pivotal in demonstrating the need for detailed educational information on bats and their housing requirements. Warm roosts, free from flight obstacles, are essential to provide suitable roosting habitats for all Canadian bats.

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Bats are an important link in our ecosystems,
a link that should not be ignored or taken for granted.

They make essential impacts on pest control for farmers and crops,
and drastically reduce the disturbances caused by insects around inhabited areas.

In return, we can decrease human impact upon them.

We should only disturb or evict bats when absolutely necessary.

Bat boxes may or may not be the answer to bat preservation,
but our program has dramatically increased public awareness
of the benefits of bats, and that is the genesis of conservation.

Thank you for taking an interest in bats.

Your participation in bat conservation can make a significant
contribution to preserving bats in Eastern Canada.